

Notice of Allowability

Application No.

10/711,394

Applicant(s)

ANDERSON ET AL.

Examiner

Hsien-ming Lee

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 4/11/2007.
2. ☒ The allowed claim(s) is/are 1-14.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 20040916 & 20050118
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

HSIEN-MING LEE
PRIMARY EXAMINER

Hsien-ming Lee
Primary Examiner
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6/10/07

DETAILED ACTION

Examiner's Amendment

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Jack P. Friedman (Reg. No. 44,688) on June 18, 2007.

2. The application has been amended as follows:

In specification, page 7, on line 6, replace "oxy nitride" with -- oxynitride --; and on line 7, replace "oxy carbide" with -- oxycarbide --.

In specification, page 6, [para 25], line 5, replace "115" with -- 120 --.

Cancel claims 15-30.

In claim 1, on line 7, delete " ," after "through" and on line 10, replace "a" with -- an -- before "electrical."

In claim 5, on line 3, insert -- , -- after "carbide", on line 3, replace "oxy nitride" with -- oxynitride --; and on line 4, replace "oxy carbide" with -- oxycarbide --.

In claim 6, on line 5, insert -- and -- before "methyl" and delete "and other low dielectric constant materials."

In claim 7, on line 3, insert -- , -- after "carbide", on line 3, replace "oxy nitride" with -- oxynitride --; and on line 4, replace "oxy carbide" with -- oxycarbide --.

Allowable Subject Matter

3. Claims 1-14 are allowed.
4. The following is an examiner's statement of reasons for allowance:

The closest prior art of record, Schwarzl et al. to US 6,686,643, teaches a related art, comprising: forming a dielectric layer I1 on a substrate; forming a capping layer M on a top surface of said dielectric layer I1; forming a trench through said capping layer M (Fig.1), said trench extending toward said substrate and into but not through said dielectric layer I1; forming a sacrificial layer F on opposing sidewalls of said trench (Fig.2); filling said trench with an insulating layer FS (i.e. SiO₂); and removing a portion of said sacrificial layer F between said insulating layer FS and a spacer SP to form air-gaps H (Fig.5).

In contrast, Schwarzl et al. neither teach nor suggest filling said trench with an electrical conductor and removing a portion of said sacrificial layer between said electrical conductor and said dielectric layer to form air-gaps. In addition, Schwarzl et al. neither teach nor suggest between steps (f) and (g) forming an extended air gaps under said capping layer by removing at least a portion of said dielectric layer adjacent to said air-gaps; forming a common surface by planarizing said capping layer, said sacrificial layer and said electrical conductor; forming a copolymer layer on said common surface; forming pores in said copolymer layer extending down to said common surface.

In the examiner's opinion, it would not have been obvious to one of the ordinary skill in the art to modify the teachings of Schwarzl et al. to arrive the present invention. In particular,

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the current invention teaches filling the trench with the electrical conductor, whereas Schwarzl et al. teach filling the trench with the insulator.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (7:30 ~ 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Hsien-ming Lee
Primary Examiner
Art Unit 2823

HSIEN-MING LEE
PRIMARY EXAMINER

6/18/07